

Remarks

Reconsideration of this Application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-5 and 7-9 are pending in the application, with claim 1 being the only independent claim. Claim 6 is cancelled without prejudice to or disclaimer of the subject matter therein. New claims 7-9 are added. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Support for the amendment to claim 1 and new claims 7-9 may be found in the claims as originally filed and throughout the specification. Specifically, support for the amendment to claim 1 is found, *inter alia*, at page 3, lines 19 and 28. Support for new claims 7 and 8 can be found in original claims 3 and 4, respectively. Support for the amendment to claim 5 and new claim 9 is found, *inter alia*, at page 3, line 16.

Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Rejections under 35 U.S.C. § 103

Claims 1-6 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over U.S. Patent No. 5,391,811 to Bohm *et al.* ("Bohm"). The Examiner asserts that the Bohm patent discloses every element of independent claim 1 but for the claimed temperature range of 103-115°C, but that Bohm discloses the range of 20-100°C. The Examiner asserts that the temperature range disclosed by Bohm is close enough to the claimed temperature range that "one skilled in the art would have expected them to

have the similar reaction conditions," and therefore it would have been obvious to the skilled artisan in the art "to be motivated to optimize the reaction temperature range by routine experimentation." Office Action, page 5. Applicants respectfully disagree and traverse.

Bohm discloses a method for the preparation of dialkyl α -fluoromalonates that requires a long reaction time of 72 hours in spite of the use of large excesses of hydrogen fluoride and triethylamine. *See* page 1, lines 19-21 of the present application, describing reference DE-A-4237882, which is the priority document to the Bohm patent.

In contrast, according to the method of the invention, the reaction time is 15 hours, and only a small excess of hydrogen fluoride and triethylamine are necessary. *See* page 3, line 7-10. Claim 1 has been amended to specify that "1.4 to 2.0 mol equivalents of an addition product of hydrogen fluoride and triethylamine per mol of starting material of structure (II)" are used in the reaction. Thus, dialkyl α -fluoromalonates are obtained in a fraction of the reaction time than that of the Bohm method. The method of the present invention is also more environmentally friendly by virtue of the reduced consumption of starting materials. *See* page 1, line 22 to page 2, line 3 of the present application.

The method of the present invention allows for the preparation of dialkyl α -fluoromalonates in good yields and shorter reaction times, whereby the space-time yield is improved. It was considered highly surprising that such a substantial improvement in space-time yield could be achieved without the use of high pressure and with only small excesses of hydrogen fluoride and triethylamine. *See* page 2, lines 20-22 of the present application.

There is no disclosure or suggestion in Bohm, nor would the skilled artisan in the art expect, that the yields and faster reaction times provided by the claimed method could be obtained by increasing reaction temperature and using lower excesses of hydrogen fluoride and triethylamine. *See also* page 3, lines 1-3 the present application. Contrary to the Examiner's assertion that the skilled artisan in the art would have expected the similar reaction conditions with the claimed ranges of 103-115 as with the range of 20-100 as described in Bohm, the skilled artisan expects partial decomposition, and consequently, lower yields at higher temperatures. In the reaction of the present method, the hydrogen chloride by-product needs to be neutralized by one mole of triethylamine. Therefore, an excess of free base is essential. However, at temperatures above 103°C, the skilled artisan would have expected the loss of the triethylamine (boiling at 88°C).

The unexpected advantages of the claimed method compared to the Bohm method are described in the Declaration of Andreas Gunther under 37 C.F.R. § 1.132 ("the Declaration"), which is submitted (unexecuted) herewith. The results described in the Declaration are unexpected and show that the presently amended claims are non-obvious in view of the teachings in the prior art. *See* M.P.E.P. § 716.02(a)-(d) and cases cited therein.

The Declaration provides a Table of the percent remaining of reactant diethyl chloromalonate ("CME" in the Table) over time in a reaction conducted in accordance with Example 1 of the Bohm patent, as compared with the percent remaining of CME in a reaction conducted in accordance with Example 1 of the present application. The data in the Table shows that the observed reaction time is shorter and the conversion rate is higher after 15 hours reaction time for the method of the present invention in comparison

to that disclosed in the Bohm patent. In particular, after 15 hours reaction time, the CME is almost exhausted in the reaction of the present invention (i.e., 2% of starting material remaining), whereas almost half of the CME in the reaction of the Bohm patent remains (i.e., 45% remaining). In the present method, a comparable consumption of CME with 46% remaining is achieved after only 3 hours reaction time.

Further, in Example 1 of the Bohm patent, 3 equivalents of reactant (i.e., 1 mole ester + 2 moles triethylamine-trihydrofluoride (TEA.3HF) + 1 mole triethylamine (TEA)), consisting of 1 (TEA): 1 hydrogen fluoride (HF) ratio, has a yield of 83%. In contrast, in Example 1 of the present application, 1.7 equivalents of reactant (1 mole ester + 0.85 mole (TEA.3HF) + 0.85 mole TEA), consisting of 1 (TEA): 1.5 (HF) ratio, has a yield of 84%. These examples show that the present method utilizes less equivalents of fluorinating agent and has a comparable yield. The skilled artisan finds no suggestion in the Bohm patent that the method of Bohm may be successfully modified to achieve the claimed method that exhibits a remarkably better conversion rate, utilizes less equivalents of fluorinating agent, and provides comparable yields in comparison to the method of the Bohm patent.

For at least the foregoing reasons, Applicants submit that claim 1 is non-obvious over the Bohm patent and request that the rejection under 35 U.S.C. § 103(a) be withdrawn.

Dependent claims 6-9

Claim 6 has been cancelled, rendering its rejection moot. Claims 2-5 and new claims 7-9 depend from and add features to independent claim 1; therefore these claims are patentable for at least the same reasons as discussed above with respect to claim 1. Applicants therefore respectfully request the rejections of claims 2-6 be withdrawn and allowed. Applicants also respectfully request allowance of new dependent claims 7-9.

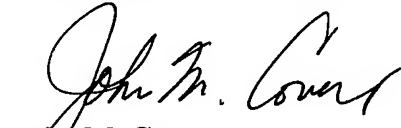
Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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